THE

GEORGE WASHINGTON UNIVERSITY

NAVY GRADUATE COMPTROLLERSHIP PROGRAM

THE MANAGEMENT IMPROVEMENT PROGRAM AT NAVY AIRCRAFT OVERHAUL ACTIVITIES

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TABLE OF CONTENTS

		Page
LIST OF ILLUSTRATIONS	. . . . .	iii
Chapter		
I.	HISTORICAL BACKGROUND OF THE MANAGEMENT IMPROVEMENT PROGRAM	1
II.	THE AIRCRAFT OVERHAUL AND REPAIR DEPARTMENTS OF THE NAVY	4
III.	EARLY STAGES OF MANAGEMENT IMPROVEMENT IN THE OVERHAUL AND REPAIR DEPARTMENTS	6
IV.	THE ENGINEERED PERFORMANCE STANDARDS PROGRAM	9
V.	THE REORGANIZATION OF THE OVERHAUL AND REPAIR DEPARTMENTS	14
VI.	MECHANIZED PRODUCTION CONTROL	18
VII.	THE COST CONTROL SYSTEM	22
VIII.	FUTURE POSSIBILITIES OF THE MANAGEMENT IMPROVEMENT PROGRAM IN OVERHAUL AND REPAIR DEPARTMENTS	25
BIBLIOGRAPHY	. . . . .	27

LIST OF ILLUSTRATIONS

Figure Page

1. Overhaul and Repair Department Organization Chart 15

CHAPTER I

HISTORICAL BACKGROUND OF THE MANAGEMENT IMPROVEMENT PROGRAM

The initial recommendation for the present formalized Management Improvement Program of the Federal Government was made by the Hoover Commission on Organization of the Executive Branch of the Government.[1] This Commission was created by a unanimous vote of Congress in July, 1947. The report of the Hoover Commission, submitted in 1949, provided the basis for Executive Order 10072 which was signed by the President on July 29, 1949.[2] This Order expressly requests department and agency heads in the Executive Branch of the Government to review all the programs for which they are responsible and to assure themselves and the President that they are being carried out as effectively and economically as possible. The Order then directs these officials to make plans for subsequent reviews of operations and to report problem areas to the Bureau of the Budget.

On October 28, 1949 Congress passed Public Law 429, Title X of which established a Management Improvement Program throughout the Government.[3] This law increased the responsibilities of

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[1] The Hoover Commission Report (New York: McGraw Hill Book Co. 1949).

[2] Executive Order 10072 (Washington, D. C., The White House, 1949).

[3] Public Law 429 Title X (1949).

the Bureau of the Budget with respect to the administration of the Management Improvement Program and established an incentive awards program to provide for payment of a part of any demonstrated savings to the individual responsible for that saving.

The Bureau of the Budget in Circular A-8 (revised) further describes the responsibilities of department and agency heads under Executive Order 10072 and Title X of Public Law 429 and provides general guides for carrying out these responsibilities.[4]

On April 20, 1951 the Secretary of Defense issued a Directive which formalized and established a Management Improvement Program for the Department of Defense consistent with the requirements of the previously cited references.[5] This Directive provided that methods of review of progress on programs and operations should be improved so that they are systematic and comprehensive and supply to each level of the organization the information most suitable for management improvement. By this method trouble areas could be identified and corrective action applied. The Directive also pointed out that the application of performance standards covering cost, quality and quantity of work would increase the effectiveness of the program.

On May 31, 1951 the Secretary of the Navy established the Navy Management Improvement Program, consistent with the requirements of the Secretary of Defense Directive, to promote, achieve

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[4] Bureau of the Budget Circular A-8, (revised) June 29, 1951.

[5] Secretary of Defense Directive, April 20, 1951.

and maintain maximum effectiveness, efficiency and economy at all levels of the organization.[6] This letter specified that, although management improvement was a responsibility of military and civilian officials at all levels of administration, the primary responsibility rested with line management.

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[6]Secretary of the Navy Letter of May 31, 1951.

CHAPTER II

THE AIRCRAFT OVERHAUL AND REPAIR DEPARTMENTS OF THE NAVY

Because of their size, complexity, and industrial type operation, the Navy's aircraft Overhaul and Repair Departments offered a likely target for the Management Improvement Program. These Overhaul and Repair Departments are located at nine of the largest Navy and Marine Corps Air Stations. Their mission is to support the Integrated Aeronautic Program of the Navy by:

1. The overhaul, modification, and repair of aircraft, guided missiles, target drones, engines, accessories and components, including disassembly, cleaning, examination, repair, modernization, test, inspection, assembly, preservation, and packaging.

2. The manufacture of aircraft parts and assemblies required in support of the foregoing program.

3. The maintenance of and, to a limited extent, the manufacture of the tools and equipment used in the performance of the foregoing work.[7]

At a typical Overhaul and Repair Department these operations are performed in some ninety shops by representatives of eighty different trades. The plant account and material inventory value may be as much as fifteen million dollars. The nine Overhaul and Repair Departments combined comprise an organization of some thirty-two thousand people with an annual payroll of approximately one hundred and forty million dollars. The large number of different models and configurations of aircraft to be

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[7] Bureau of Aeronautics Instruction 5451.12, dated September 1, 1954, Navy Department, Washington, D. C.

overhauled, the variations in the extent of overhaul required by crash damage, the great many different types of components and accessories to be overhauled, and the necessity to revise schedules and priorities in accordance with fleet requirements result in a very complex problem of workload scheduling. The vital importance to fleet and training commands of the work accomplished by the Overhaul and Repair Departments and the size, complexity of operations, amount of money and number of personnel involved, make it essential that every effort be made to insure the maximum efficiency of operation. It is the purpose of this paper to examine the Management Improvement Program with respect to these Overhaul and Repair Departments.

CHAPTER III

EARLY STAGES OF MANAGEMENT IMPROVEMENT IN THE OVERHAUL AND REPAIR DEPARTMENTS

The Overhaul and Repair Departments at the Naval and Marine Corps Air Stations are subject to management and technical control by the Bureau of Aeronautics. As soon as the pressure of wartime operations was relieved, this Bureau inaugurated programs with the specific intent of improving management in the Overhaul and Repair Departments. In 1946 a thirteen week course in Management Engineering was established at the Naval Air Station, Alameda, California. This course was designed to provide training for qualified officers and civilians in the application of the latest management engineering procedures to Overhaul and Repair Department operations. Subsequently management engineering offices were established in all the Overhaul and Repair Departments and in the Maintenance Division of the Bureau of Aeronautics.

In 1947 the Bureau of Aeronautics and the Bureau of Supplies and Accounts jointly developed an Overhaul and Repair Department Cost Accounting System. A pilot installation of this system was completed at the Naval Air Station, Norfolk, Virginia, and the system was later incorporated at all Overhaul and Repair Departments. A handbook to provide complete instructions for the operation of the cost accounting system was prepared and issued. This handbook has been revised from time to time in order to

incorporate those changes which experience has shown to be necessary.[8]

The cost accounting system was designed to provide management at the Overhaul and Repair Departments and in the Bureau of Aeronautics with information for the development of norms in terms of man hours and costs. These norms would provide a means for controlling the expenditure of man hours and funds as well as a method of making more accurate allocations of personnel ceilings and funds for the overhaul, modification, and repair of aircraft and engines and related programs. The system would also be of assistance in evaluating performance at all levels in the Overhaul and Repair Departments and in justifying budget estimates.

From the data provided by the cost accounting system the Industrial Cost Report is prepared and submitted to the Bureau of Aeronautics. This report is composed of three sections as follows:

Section A presents a summary report of all man hours expended and costs incurred by the Overhaul and Repair Department during the month.

Section B shows the direct man hours and costs expended in various categories of work.

Section C provides the monthly station overhead computation and general statistics.

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[8] Aeronautics Overhaul and Repair Cost Accounting Handbook NAVEXOS P-1214 Office of the Comptroller, Department of the Navy, October 1953.

In addition, the system provides information for the compilation of local reports in general detail. These reports are utilized by the individual Overhaul and Repair Departments where required for effective management.

The cost accounting system was a great improvement over previous methods of computing costs but it still left much to be desired. The norms obtained were basically statistical averages of past performance and thus were not representative of the performance which should be expected using methods and times developed through engineering studies of operations. There was no provision built into the system for obtaining the variance between actual performance and that which should be expected. In addition, the cost accounting data were both so voluminous and so delayed in presentation as to be of little use in control of current operations.

The next step taken along the road of improved management was the development of the engineered performance standards program.

CHAPTER IV

THE ENGINEERED PERFORMANCE STANDARDS PROGRAM

By 1951 the Management Improvement Program was being emphasized at all levels in the Government. One common feature of many of the directives issued was the specification that performance standards should be developed wherever possible. Many of the techniques utilized in the establishment of performance standards had not been permitted in government activities for many years because annual appropriation acts prohibited the use of time measuring devices in studying operations. This prohibition was omitted in the Defense Appropriation Act of 1951 and in subsequent acts.

On March 5, 1951 the Secretary of the Navy set forth the Navy policy on the establishment of performance standards.[9] He declared that performance standards were not speed-up devices but rather a means of determining effectiveness of performance for management improvement purposes, realistically determining manpower requirements, and determining the justifying budgets. The Secretary encouraged the use of engineering techniques for the development of such standards. With this support the Bureau of Aeronautics proceeded to develop and install an Engineered Performance Standards Program at all the Overhaul and Repair Departments.

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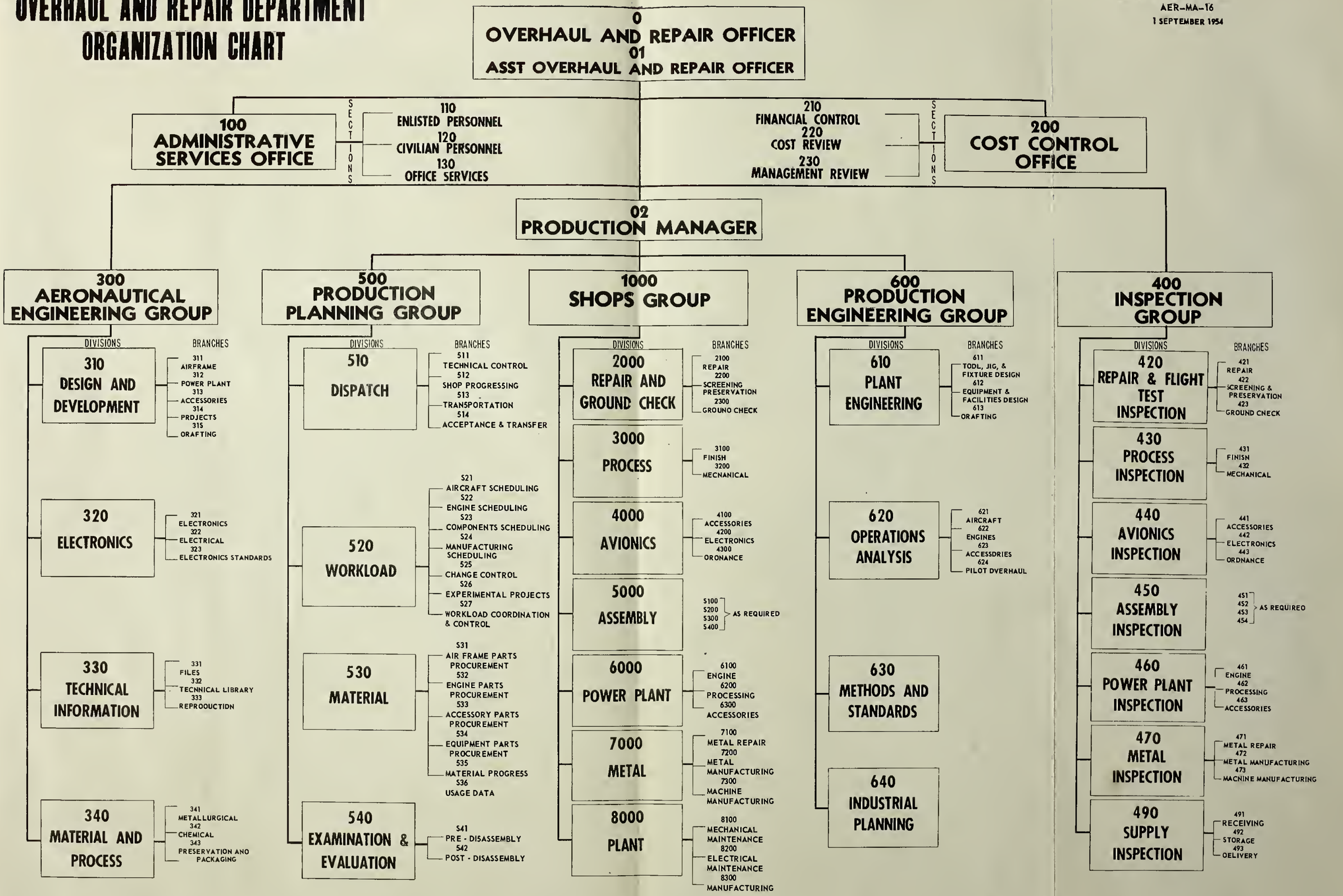
[9]Secretary of the Navy Letter of March 5, 1951

Engineered performance standards are determined by the use of time studies or other accepted measuring techniques after the operation has been standardized. This standardization is accomplished by first insuring that the operation in question is necessary and then improving the operation wherever possible by work simplification, better tooling, revisions in plant layout or providing more efficient work flow. When the operation has been standardized, time readings are obtained for each element. When these times are compiled, with due allowances for such factors as fatigue, delay and degree of worker skill, a rate is obtained which becomes the standard for all workers performing the same operation under standard conditions.

The objectives of the Engineered Performance Standards Program are to reduce the costs of operations by methods improvements, work simplification, increased productivity, more efficient planning and scheduling, better utilization of manpower and more reliable budgets.

Before becoming committed to such an extensive and expensive program as the installation of engineered performance standards in the Overhaul and Repair Departments it was necessary that the Bureau of Aeronautics make certain that standards were applicable to the great variety of operations involved in overhaul and repair work and to determine the most efficient and economical method of establishing the program. As a result of visits to a number of civilian industrial concerns and studies

OVERHAUL AND REPAIR DEPARTMENT ORGANIZATION CHART



~~ENCLOSURE (1)~~
Fig. 1

made of their operations it was determined that standards could be developed and applied to overhaul and repair work and that the use of a consultant to initiate the program was recommended. The studies conducted also stressed the importance of informing all employees of the nature, objectives and progress of the program in order to minimize misunderstandings, and the necessity for insuring the full support of all levels of management.

Since this would be the first attempt in the Navy to establish a large scale program of engineered performance standards it was realized that a successful installation at one activity would be necessary in order to justify the cost of incorporating the system at all the Overhaul and Repair Departments. The Overhaul and Repair Department of the Naval Air Station, Jacksonville, Florida was selected for a limited cost prototype of the program in order to evaluate the results.

The decision to utilize the services of a consultant was based on two primary considerations. First of all, Navy personnel skilled in the necessary techniques were not available and a program to develop qualified personnel entirely within the Navy would prove costly and result in undesirable delay. Secondly, a consultant would be able to examine problem areas objectively from an "outsider's" viewpoint and, because of his experience and unbiased viewpoint, his recommendations would be received more favorably by the Overhaul and Repair Department personnel.

A special board was appointed within the Bureau of Aeronautics to select a consultant. After an initial review of some seventy-five member companies of the Association of Consulting Management Engineers, seven companies were asked to bid for the contract. George H. Elliott & Company was finally selected to devise an engineered performance standards system, install and implement the system and to train personnel in the use of the system. The initial development installation and evaluation of the pilot system took place at the Naval Air Station, Jacksonville during the period between October 1951 and June 1952.[10]

The evaluation of the results obtained from the pilot system firmly established the value of engineered performance standards and resulted in the negotiation of additional contracts with the consultant for the installation of systems at the other Overhaul and Repair Departments. The evaluation also revealed weaknesses in the organization structure of the Overhaul and Repair Departments, and the need for improved production and cost controls. These problems will be discussed in subsequent chapters in this paper.

Substantial savings as a result of productivity increases have already been realized and these savings have more

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[10] Weldon, R. A., Cdr. USN, "Engineered Performance Standards, Their Application at an Aircraft Overhaul Activity of the Navy," Unpublished paper, School of Government, The George Washington University, 1954.

than offset the costs of the program. It is estimated that the increase in productivity will eventually stabilize at a figure between fifteen and twenty percent.

When the maximum coverage by performance standards has been achieved with respect to operations in the productive shops it is intended to extend the use of engineered performance standards to the service areas of the Overhaul and Repair Departments.

A new position has been established in the Bureau of Aeronautics to provide for the coordination of engineered performance standards in all of the Overhaul and Repair Departments in order to obtain the maximum benefits from the exchange of ideas and procedures and the comparison of standards.

CHAPTER V

THE REORGANIZATION OF THE OVERHAUL AND REPAIR DEPARTMENTS

As the installation of the engineered performance standards program progressed it became obvious that certain changes would be required in the organization of the Overhaul and Repair Departments in order to make full and effective utilization of the standards and other modern industrial techniques which were under consideration. Accordingly, the Bureau of Aeronautics, in conjunction with the Overhaul and Repair Departments at the Naval Air Stations, Alameda, San Diego, and Quonset Point developed and tested on a prototype basis a number of organizational changes.

The results of the successful culmination of these efforts was a reorganization of the Overhaul and Repair Departments which was promulgated by the Chief of the Bureau of Aeronautics on September 1, 1954.[11] It is necessary that all the Overhaul and Repair Departments comply with the standard organization in order to promote efficiency in the field activities and to simplify the management problem in the Bureau of Aeronautics.

The new Overhaul and Repair Department organization chart is shown in Figure 1. It is not the purpose of this paper to make

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[11] Bureau of Aeronautics, Department of the Navy, Organization Manual for Overhaul and Repair Departments at Naval and Marine Corps Air Stations, Washington, D. C., 1954.

a detailed analysis of this organization, nor is it proposed to analyze each point wherein the new organization differs from the old one. Instead a few of the significant changes will be discussed with respect to their importance in an organization designed to take full advantage of engineered performance standards, production planning and control, and cost control.

The Production Manager is a new military billet to be responsible for directing and coordinating the efforts of the Shops, Production Planning, and Production Engineering Groups in the proper accomplishment of assigned workload.

The Production Engineering Group is a new group to provide closer study and analysis of methods, operations and their sequence and performance times required. Through the Methods and Standards Division it develops and maintains methods analysis and time standards. Through the Industrial Planning Division it specifies plant layouts, controls assignment of spaces, and plans new or modified production facilities.

The Production Planning Group is an expanded planning organization to provide more extensive and accurate planning and control of the production workload. This Group is responsible for the operation of the mechanized production control system which will be described in Chapter VI.

The Cost Control Office is new and the Cost Control Officer is responsible to the Overhaul and Repair Officer for the

expenditure of all funds assigned to the Overhaul and Repair Department. He supervises the formulation of the Department budget which is based on the performance budget concept. He operates the cost accounting system and maintains the cost control program. This office is responsible for the installation and operation of the new and more comprehensive cost control system which will be described in Chapter VII.

In addition, the functions of individuals at every level of supervision in the new organization emphasize the necessity of employing modern industrial practices in order to accomplish the most efficient utilization of manpower and facilities, of adopting sound principles of human relations, and of establishing an adequate system of management controls. These procedures will insure proper allotment budgeting and administration and the most economical expenditure of funds.

CHAPTER VI

MECHANIZED PRODUCTION CONTROL

Planning and scheduling have always been serious problems in the Overhaul and Repair Departments because of the number of different models of Aircraft overhauled and repaired in various configurations, the large number of components and accessories involved, and the variations in the depth of overhaul necessitated by the condition of each individual aircraft. As far back as 1949 several of the Overhaul and Repair Departments began experimenting with systems of production control which would utilize the capabilities of modern electrical accounting machines.

In 1951 programs of this type received top level support with the formalization of the Navy Management Improvement Program. A short time later the development of engineered performance standards provided both an essential tool and an urgent requirement for more efficient methods of production control. This results from the fact that precise performance standards are essential for effective control of production. At the same time accurate planning of shop loading and material requirements is necessary if engineered performance standards are to be met.

After an extensive investigation of methods employed by industries in achieving production control, the Bureau of Aeronautics, in conjunction with several of the Overhaul and

Repair Departments, developed a system of mechanized production control. An operations manual containing instructions for the installation and operation of this system has been issued and the system is scheduled to be in operation in all the Overhaul and Repair Departments by July 1, 1956.[12]

The operation of the mechanized production control system will start with a pilot overhaul team composed of a nucleus of highly trained personnel from the Operations Analysis Division plus carefully selected mechanics from the operating divisions. This team will conduct a pilot overhaul of each new model of aircraft scheduled for overhaul. From the pilot overhaul the team compiles Master Data Records which contain all pertinent data on the operations and moves necessary to overhaul the aircraft and its components. From these records personnel in the Electric Accounting Machine Room prepare a master file which consists of master move cards and master operations cards.

In addition to all the information necessary to identify the part involved, each master move card contains the shops involved in the move and the scheduled time of the move based on the number of days after induction of the aircraft. The master operation to be performed, the standard time allowed, and the schedule based on the number of elapsed days after induction of the aircraft.

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[12] Maintenance Division, Bureau of Aeronautics, Washington, D. C. Overhaul and Repair Department Mechanized Production Control Operations Manual, 1955.

These master cards are used to prepare automatically on electric accounting machines all the necessary move and operation documents for each aircraft inducted for overhaul. Necessary adjustments are made when warranted by the condition of the aircraft.

Control centers throughout the department perform all dispatching, shop scheduling, shop loading, reporting, routing and time recording. These centers report the progress of work by means of move cards which indicate the part in question has left the control center, and job cards which indicate the number of man hours expended in working on the part and the rate of pay of the employee. These cards can be processed by the electric accounting machines and provide the basis for management production control reports such as the following:

1. A load report for each aircraft or engine inducted. This information makes it possible to project shop loading.
2. A load variance report. This report points out variations between the number and skills of personnel available in each shop and the number required by the projected workload.
3. A summary of delays report. This provides top management with information as to where, and by how much, production was behind schedule.

4. Various performance reports which compare actual man hours against standard man hours may be prepared. By utilizing these reports management can take prompt action to alleviate troubles in areas which reveal exceptional variances from the standards.

CHAPTER VII

THE COST CONTROL SYSTEM

The next step in the Management Improvement Program in the Overhaul and Repair Departments was to provide a cost control system which would make use of the engineered performance standards, the standard organization and the mechanized production control system, within the framework of the cost accounting system. It was intended that such a cost control system would provide all levels of management with timely and accurate reports of actual versus standard costs of labor, material and overhead so that management could properly control these costs and also effectively evaluate the performance of the individuals in charge of organizational units. In addition, the system would also provide the Bureau of Aeronautics with a means of evaluating and comparing the performance of the several Overhaul and Repair Departments.

The employment of a consultant in the development of the cost control system was warranted by the same factors which related to the development of the engineered performance standards. Therefore, after careful consideration of all the companies active in this field, the Bureau sent specifications for the proposed system to nine selected companies. After interviews with the seven companies which submitted bids, the

Wolf Management Engineering Company of Chicago, Illinois, was awarded the contract.

The Wolf Company began its study of the Overhaul and Repair Departments on April 5, 1954 and visited the Bureau of Aeronautics and the Naval Air Stations at Quonset Point, San Diego and Alameda, and the Marine Corps Air Station, Cherry Point.

The Overhaul and Repair Department at Alameda was selected by the Bureau of Aeronautics and the Wolf Company as the pilot plant for the development and installation of the cost control system. This installation has been completed and a handbook describing the system and the procedure for its installation has been prepared.[13] This manual has been distributed by the Bureau of Aeronautics and the system is scheduled for installation in all the Overhaul and Repair Departments by July 1, 1956. The work of the Wolf Company has been completed with the exception of follow-up visits to each of the Overhaul and Repair Departments to help solve any problems which arises in connection with the installation of the system.

The cost control system was developed in accordance with these basic concepts:

1. Costs include all expenditures of labor and materials and all costs must be subjected to control.
2. The cost control system must be closely allied with the organization so that some one individual

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[13] Bureau of Aeronautics, Navy Department, Washington, D.C. Overhaul and Repair Cost Control System Handbook, 1955.

can be held accountable for each item of cost.

3. Standards must be developed as measuring devices.
4. The system must provide the appropriate level of management with actual costs compared to the standard, an analysis of variances from standards, and the name of the individual responsible.
5. The control costs must be a dynamic rather than a static concept and therefore management must take prompt and effective control action when conditions warrant.

It is anticipated that the cost control system will enable the Overhaul and Repair Departments to lower unit costs without reducing the quality of the work accomplished. As the installation of the system progresses operating reports will be carefully examined by personnel of the Bureau of Aeronautics to determine the extent of cost reduction that has been achieved.

CHAPTER VIII

FUTURE POSSIBILITIES OF THE MANAGEMENT IMPROVEMENT PROGRAM IN OVERHAUL AND REPAIR DEPARTMENTS

The Navy Management Improvement Program has thus far accomplished a great deal in making the latest developments of modern industrial management available to the Overhaul and Repair Departments. However, a great deal remains to be accomplished.

As the coverage of operations by engineered performance standards is increased and the installations of mechanized production control and cost control systems are completed there will be available in the Overhaul and Repair Departments a great wealth of data which should prove invaluable to the Bureau of Aeronautics in exercising management control in the areas of planning, scheduling, and budget formulation, justification and execution. There is a need to develop effective means of reporting, recording and utilizing these data. In order to prevent the avalanche of statistics which the systems are capable of generating, it will be necessary to take precautions to insure that only information for which there is a specific requirement is reported.

Another subject for future consideration is the question of incentive pay; that is, premium pay for above standard performance. Such an incentive awards program has been authorized in Title X of Public Law 429. It is expected that the engineered

performance standards and the cost control system will provide motivation for the individual employee in several ways. He will take pride in his personal work meeting or surpassing the standard, there will be a desire to see his shop up to standard, and finally the realization that his continued employment may depend upon the performance of his Overhaul and Repair Department in comparison with other Departments and with commercial concerns. The Bureau of Aeronautics will have to weigh the possibilities of obtaining increased production through the use of incentive pay against the cost and administrative problems of such a program.

Finally, there will be many management problems to be solved if the Naval Industrial Fund Accounting System is extended to the Naval Air Stations and their Overhaul and Repair Departments. In this respect precautions have been taken to insure that those phases of the Navy Management Improvement Program established in the Overhaul and Repair Departments are fully compatible with the Naval Industrial Fund. Furthermore, many of the systems developed under the Management Improvement Program will facilitate the transition to, and operation under the Industrial Fund.

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